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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,175	07/17/2003	Andrew R. Adams	CISCO-7343	2151
21921	7590	12/16/2005	EXAMINER	
DOV ROSENFELD 5507 COLLEGE AVE SUITE 2 OAKLAND, CA 94618			JACKSON, BLANE J	
			ART UNIT	PAPER NUMBER
			2685	

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/622,175	Applicant(s) ADAMS ET AL.	
	Examiner Blane J. Jackson	Art Unit 2685	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-5, 7, 8, 11-21, 28-32 and 34-41 are rejected under 35 U.S.C. 102(a) as being anticipated by Kang et al. (US 6,498,927).

As to **claims 1, 11 and 38-41**, Kang teaches a digital radio receiver and method for controlling the gain of a radio receiver comprising:

A receive signal path including:

A filter (figure 8, filter (836)),

A pre-filter section prior to the filter including at least one adjustable gain element to provide an adjustable gain to the pre-filter section (LNA (810)),

At least one post-filter section after the filter including at least one adjustable gain element to provide an adjustable gain to the post-filter section (VGA (846) of the baseband section),

A pre-filter signal strength detector coupled to the pre-filter section to measure the relative strength of the signal at a point in the receive signal path prior to filtering by the filter (power detector (820)),

A post-filter signal strength detector coupled to the **post-filter** section to provide a measure of the relative strength of the signal at a point in the receive signal path after filtering by the filter (power detector (856), column 7, line 63 to column 8, line 17),

An automatic gain controller coupled to the pre-filter and post-filter signal strength detectors and further coupled to the variable gain elements to set the gains of the respective sections according to the pre-filter and post-filter signal strength measures, the gains setting providing an overall gain setting for the receive path (gain controller (828), column 8, lines 19-34 and column 9, lines 5-23), such that the gain settings of the pre-filter and post-filter variable gain elements adapt according to the signal characteristics and take into account the amount of filtering provided by the filter (an awareness of the effect of the gain, mix or filter in each stage with respect to the wanted and interference signal is known by the gain controller in determining gain control at each stage, figures 7 and 8, column 4, line 59 to column 5, line 11 and column 9, lines 5-22, to meet the requirements of noise and linearity).

As to **claims 2 and 13** with respect to claims 1 and 11, Kang teaches the AGC controller corrects and averages each of the pre-filter and post-filter signal strength indications, compares the pre-filter and post-filter corrected averaged signal strength indications to respective pre-filter and post-filter desired signal powers and adjusts the gains of the respective sections to reduce the differences between the corrected averaged indications and desired signal powers (column 9, lines 23-50).

As to **claims 3** with respect to claims 2, Kang teaches the correction of the pre-filter and post-filter signal strength indications is to bring the indications to a common scale so that the indications may be compared and wherein the adjusting of the gains of at least one of the sections depends on both the pre-filter and post-filter corrected and averaged signal strength indications (gain controller determines optimum gain distribution, column 10, lines 1-37).

As to **claim 4** with respect to claim 2, Kang teaches the AGC controller operates in sequential stages, each stage setting the gains of one or more sections (figure 8).

As to **claim 5** with respect to claim 4, Kang teaches a first stage sets the gain of the pre-filter section according to the pre-filter signal strength indications and other stages finalize the gain setting of the post-filter section, section by section according to additional signal strength indications from the relevant sections (the gain controller (828) determines an optimal gain distribution for each section since it knows the gain assignment and signal level of each stage, column 10, lines 12-18).

As to **claim 7**, Kang teaches the receiver uses a direct conversion architecture such that the receive signal path includes an R section operating at RF and direct downconversion from the RF section to a baseband section operating at baseband and wherein the filter is in the baseband section such that the one or more post-filter sections are in the baseband section (figure 8, column 13, lines 26-40).

As to **claim 8**, Kang teaches the AGC controller is a digital controller, the receiver further includes one or more analog to digital converters to convert the pre-filter and post-filter signal strength indications to digital signals for input to the AGC controller (figure 8, the controller processes digitized information from AGC (884) and the power detector(s) (820), column 8, lines 19-34 and digital gain control: column 12, lines 9-52).

As to **claim 12**, Kang teaches the accepting of the measures includes calibrating the pre and post filter signal strength measures so that they may be compared (gain controller (828) is taught the gain assignment and signal level of each stage and can directly determine the optimal gain distribution where the criteria used depends on the configuration of the radio receiver, column 10, lines 12-19).

As to **claims 15 and 30**, Kang teaches an AGC controller and method for controlling the gain of a radio receiver for receiving packets of information, the receiver connected to an antenna subsystem the receiver's receive signal path including a plurality of sections including a first section coupled to the antenna subsystem and a next section each section having an adjustable gain, each section able to provide a measure of the signal strength at its output (figure 8, a RF and baseband stages, both with an adjustable amplifier and power detector under control of a gain controller (894)), the method further comprising:

Waiting for a start of packet indication (method applicable to digital wireless communication including GSM, PCS and IMT2000, column 13, lines 41-52 and modem detects the incoming in-band signal, column 9, lines 24-41),

Providing measures of the signal strengths at the outputs of the first and the next sections (figure 8, power detectors to the gain controller, column 9, lines 5-22),

Adjusting the gains of the first and the next sections using the provided measures of signal strength (column 9, lines 41-50).

As to **claims 14, 17, 20 and 31** with respect to claims 13, 15, 19 and 30, Kang teaches the setting of gains of at least one of the sections depends on both the pre filter and post filter corrected averaged signal strength measures to account for the amount of filtering provided by the filter (gain controller determines optimum gain distribution, column 10, lines 1-37 with an awareness of the effect of the filter on an interference signal since a power detector follows each section with and without a filter, column 4, line 59 to column 5, line 11).

As to **claim 16**, Kang teaches setting the gains of the sections to a default level prior to waiting for a start of packet indication (figure 11A, column 10, line 60 to column 11, line 18).

As to **claims 18, 21 and 32** with respect to claims 15, 18 and 30, Kang teaches the gain adjusting of the sections is carried out sequentially in respective AGC stages, each stage adjusting the gain of one or more corresponding sections (figure 8), each stage including:

Providing a measure of the signal strengths at the ends of the corresponding sections (power detectors (820) for the RF section and power detector (856) or (868) of the baseband section),

Comparing the provided measures of signals strength at the ends of the corresponding sections to a desired signal strength level for each corresponding section,

Adjusting the gain of the corresponding sections according to the respective differences between the desired levels and the provided measures of signal strength for the respective corresponding sections (the gain controller (828) determines the optimal gain distribution for each gain stage as monitored by the associated power detector, column 9, lines 5-22).

As to **claim 19** with respect to claim 18, Kang teaches the providing the measures of the signal strengths at the ends of the sections includes calibrating so that the measures may be compared (the gain controller knows the gain assignment and signal level of each stage to directly determine the gain distribution with criteria that depends on the configuration of the receiver; the gain controller must understand the coupling factors of each power detector and dynamic range of each amplifier to

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determine a gain setting for each stage with respect to the overall gain distribution, column 10, lines 12-19).

As to **claims 28 and 34** with respect to claims 18 and 32, Kang teaches at each stage, the comparison for each section determines a respective set point error and the adjusting of each section includes determining a requested gain as the existing gain produced by the current gain setting minus the set point error from the respective comparison step, the adjusting including mapping the existing gain minus the set point error to a respective gain setting (the total gain for the receiver is controlled by the gain controller that determines which stages are to be adjusted to achieve improved performance, column 9, lines 23-67).

As to **claims 29 and 35** with respect to claims 28 and 34, Kang teaches the result of providing a measure of signal strength for at least one of the sections is used to update the gain settings for multiple selected sections of the receive path (the individual stage power monitor provides information to correct each stage in relationship to the required total signal gain, column 9, lines 5-22 and column 10, lines 12-15).

As to **claim 36** with respect to claim 34, Kang teaches an AGC controller comprising a finite stage machine configured to carry out the waiting and AGC stages (figure 8, the AGC (884), gain controller (894), power detectors (820) functions comprise the finite stage machine).

As to **claim 37** with respect to claim 34, Kang teaches an AGC controller comprising a processing system programmed to carry out the waiting and AGC stages (gain controller (894) inherently includes a processing system to determine the control of the gain distribution in the receiver gain stages, column 10, lines 12-18).

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6, 9, 10, 24 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (US 6,498,927).

As to **claim 6** with respect to claim 1, Kang teaches system application to a direct conversion but is silent to a superheterodyne system where the receive signal path includes an RF and intermediate frequency sections, figure 8. However, Kang teaches the system is applicable to direct conversion quadrature receivers, wired cable modems as well as application in GSM, PCS and IMT2000 wireless communication receivers, column 13, lines 41-48.

It would have been obvious to one of ordinary skill in the art at the time of the invention to realize in the wide variety of applications of the system of Kang to implement gain control in all familiar architectures of highly integrated radio receivers in

which channel selection filtering and gain assignment is distributed to several gain and filtering stages.

As to **claim 9** with respect to claim 6, Kang teaches the receive signal path further comprises:

An analog to digital converter to convert the output of the last analog component in the receiver signal path to a digital output signal (figure 8, ADC (876), column 13, lines 26-40),

Wherein there are two or more post filter sections including a first post filter section and a second post filter section, the second post signal section including the analog to digital converter (baseband stage (829) includes two VGA/ detector/ filter section and a third VGA/ detector section),

Wherein the post filter signal strength detector is coupled to the first pre filter section (power detector (856)),

Wherein the digital signals from the ADC provide a measure of the signal strength post-digitization to the AGC controller (figure 8, ADC (876) coupled to AGC (884) to gain controller (894)),

Wherein the AGC controller is to set the gains of the pre filter section, the first post filter section and the second post filter section according to the pre filter and post filter signal strength measures and the post digitization signal strength measure (column 8, lines 19-63).

As to **claim 10** with respect to claim 6, Kang teaches the signal path includes a second filter between any variable gain element in the first post filter section and any variable gain element in the second post filter section such that the gain setting takes into account the amount of filtering by the second filter in addition to the amount of filtering by the first filter (figures 5A, 5B and 8, filters (836) and (852), column 8, lines 35-63).

As to **claims 24 and 33** with respect to claims 18 and 32, Kang teaches a *direct conversion receiver* that includes in its receive signal path a downconverter to convert a received signal at RF to a baseband signal including two filters in the baseband part (figure 8, column 8, lines 35-63). Kang further teaches the receive signal path is including a pre-filter section before the filter, a post filter section after the filter and a third section after the post-filter section wherein the plurality of AGC stages includes *two stages, the first RF stage* including setting the gain of the post filter section and the *second baseband stage* including setting the gain of the third section (two stages comprising four sections: an RF and baseband stage with three sections comprising an adjustable amplifier and power detector in the first baseband section and an amplifier/detector/ filter combination in the second and third baseband sections, figure 8).

Kang is silent to a superheterodyne system where the receive signal path includes three stages including a RF and intermediate frequency stages. However, since Kang teaches the system is applicable to wired cable modems as well as GSM,

PCS and IMT2000 wireless communication receivers which are known in the art configured in a direct or superheterodyne configuration, column 13, lines 41-48.

It would have been obvious to one of ordinary skill in the art at the time of the invention to realize in the wide variety of applications of the system of Kang to implement gain control in all familiar architectures of highly integrated radio receivers in which channel selection filtering and gain assignment is distributed to several gain and filtering stages.

Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (US 6,498,927) with a view to Yang (US 2004/0242177).

As to **claims 22 and 23** with respect to claim 18, Kang teaches a receiver comprising multi-stage digital AGC for application in a wireless network but does not specifically teach application to the IEEE 802.11 standard.

Yang teaches a wireless WLAN IEEE 802.11 standard receiver with packet level automatic gain control, figure 1, and paragraphs 0046-0053.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kang for application as taught by Yang for enhanced AGC control of a WLAN receiver.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (US 6,498,927) with a view to Katsura et al. (US 6,373,907).

As to **claim 25** with respect to claim 24, Kang teaches providing the measure of signal strength for the pre filter and post filter stages (two filter sections in the baseband stage but modified for an IF stage, reference claim 24) includes for each stage a measure of the respective signal strength, converting the respective measured signal strength to digital signal strength samples to produce pre filter and post filter signal strength measurements respectively, to compare to the desire values in the respective comparing steps (gain controller (828) knows the gain assignment and signal level of each stage to determine gain distribution, column 10, lines 12-37), and

providing the measure of signal strength for the third (second baseband) stage includes providing a baseband output of the third section, converting the baseband output of the third section to digital samples, converting the digital samples to digital signal strength samples in a scale, correcting and averaging a set of the scaled digital signal strength samples to produce a third signal strength measurement to compare to the desired value in the comparing step of the third stage (analog to digital conversion of the baseband signal at ADC (876) and output applied to the AGC (884) to derive control signals (886) and (888) to the gain controller (894) for determining of individual stage gain based on the monitored stage power, figure 8, column 8, line 64 to column 9, line 22).

Kang is silent as for each stage (section) providing a measure of the respective signal strength in a logarithmic scale but inherently teaching converting the respective measured signal strength to digital signal strength samples.

Katsura teaches a wireless AGC equipped receiver with a baseband stage comprising an adjustable amplifier (15) followed by a filter (7) and a second variable gain amplifier (8) where the signal power is detected after the filter, prior to the second amplifier, figure 2. Katsura further teaches the sampled signal power is processed in sequence by a logarithmic amplifier (11), analog to digital converter (12) and control unit (13) to determine a control signal to the baseband stage amplifiers column 3, line 57 to column 4, line 26.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the power detection function of Kang with the logarithmic amplifier of the AGC system as taught by Katsura to monitor and amplify signal power over a wide dynamic range.

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al. (US 6,498,927) with a view to Kishimoto et al. (US 2002/0118724).

As to **claims 26 and 27** with respect to claim 18, Kang does not teach a wireless receiver comprising two antennas via a diversity switch.

Kishimoto teaches a WLAN receiver with antenna diversity, figure 6. The receiver includes one of two or more selected antennas to supply a signal to the receiver for downconversion to an intermediate frequency signal *and the AGC (107) provides variable gain to maintain substantially constant amplitude output, in conjunction with the selected antenna, to a detector*, paragraphs 0027 and 0028. Kishimoto discloses a RSSI unit (108) monitors the gain control signal from the AGC to measure the signal

intensities of the signals from the antennas and the output is applied to a comparing unit which compares the RSSI signal and a threshold value upon which to make a judgment on the quality of the receiving condition and trigger an antenna change as required, paragraphs 0142-0145.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kang with the antenna type diversity taught by Kishimoto to further support the automatic gain control.

### ***Conclusion***

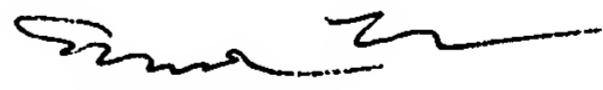
3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kuo et al. (US 5,339,454) discloses a particular automatic gain control for a wireless receiver. Ichikawa et al. (US 4,776,040) discloses a superheterodyne receiver with AGC utilizing level detectors on three stages with amplifier control in the RF and baseband stages. Gu (US 6,950,641) discloses a direct conversion receiver with AGC including level detection and a variable amplifier in the RF stage. Yamanaka et al. (US 56,728,524) discloses automatic gain control of two RF stage amplifiers in a direct conversion receiver. Graziadei et al. (US 4,872,206) discloses a superheterodyne receiver with pre and post filter detection functions to signal automatic gain control of several RF and baseband amplifiers. Filipovic (US 2003/0227986) discloses digital automatic gain control suitable for wireless networking standard IEEE 802.11 standards. Melamed (US 2003/0190903) discloses diversity antennas for signal quality selection by a wireless communication device.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Blane J. Jackson whose telephone number is (571) 272-7890. The examiner can normally be reached on Monday through Friday, 8:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BJJ



Blane J. Jackson  
Examiner  
Art Unit 2685  
Patent Office